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Effect of Implementation Lesson Study to Improve Students' Learning Achievement in Calculus I of Mathematics Department

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Abstract
This study specifically aims: 1) To determine the success of learning application lesson study with cooperative model in Calculus I subject in the Department of Mathematics, 2) To determine students' learning activity during the learning process that is usable by teachers in implementing the learning. The method used in this study using Classroom Action Research (CAR) and adapted to the conditions of the development of the research conducted in the Department. Study pattern through the stages of planning, implementation, observations and follow-up. The research was conducted at the Department of Mathematics UNIMA for the first semester students 2011/2012 academic year with the number 28 special on Mathematics Education Program in class B.
Results were obtained: 1). Student learning achievement implement a lesson study with cooperative learning model to improve learning achievement of students to achieve mastery of 85.71% for the material relations and functions, while for the material derivative reaches 82.14%, on the Calculus I subject in the Department of Mathematics UNIMA, 2). Models of cooperative learning in study Calculus I with the pattern of lesson study allows the exchange of learning between faculty and students and between students and students and between faculty and lecturers.

Keywords: Application of Lesson Study, student learning achievement, Calculus I.

1. INTRODUCTION

Government policy particularly in the Ministry of Education and Culture to improve the standard graduation rate on the National Exam (UN) SMP / A / K, MTs /A every year spawned its own challenges in the educational unit, especially among teachers in schools and LPTK. Breakthroughs continue to find innovative learning by teachers and lecturers LPTK and education observers to be able to improve the quality of teaching so the students'quality in learning increased.
One of the problems or educational topics interesting to be discussed nowadays is about Lesson Study, which emerged as one of the alternatives to solve the problem of learning practices that have been deemed less effective. Such as we know, there has been a long time the practice of teaching in Indonesia in general tends to be done through conventional oral communication techniques. Conventional instructional practices are more likely to emphasize on how teachers teach (teacher-centered) than on how students learn (student-centered), and the overall results can we assume that it was not a lot to contribute to improving the quality of students' learning processes and their achievement. To change practice learning habits from conventional to student-centered is not easy, especially among teachers who belong to the group laggard (repellent change / innovation). In this case, it seems Lesson Study can be used as an alternative to foster change in instructional practices in Indonesia to be more effective.
This research specifically focuses on the problem of learning Calculus on campus, especially for students majoring in Mathematics to build scientific concepts of Mathematics at the next lecture in the Department of Mathematics. Calculus as one of the compulsory subjects in the Department of Mathematics, Calculus I subject is a very important building advanced mathematical concepts in lectures in the Department of Mathematics. The difficulty happened until now is still not able to analyze the basic concepts from the study of mathematics in high school. It can be understood that complaining in general by students, because they should understand not only math concepts but also be able to perform the logic of mathematical analysis. These two concepts are in desperate need of a good logic analysis by each student. The problem is certainly not easy to teach mathematics properly, interesting and fun as well as challenging to produce optimal learning results. Attempt is made through Lesson Study. This study, will be presented briefly about what is the Lesson Study and how the stages in the Lesson Study, with the hope of understanding as well as to inspire the teachers (prospective teachers), lecturer LPTK and other related parties to be able to develop lesson study more further for the purpose of improving the quality of students' learning processes and outcomes.

The concept and practice of Lesson Study was first developed by the teachers of basic education in Japan, which in its Japanese termed kenkyuu Jugyo. Makoto Yoshida, who is credited in developing kenkyuu Jugyo in Japan. Japan's success in developing lesson study seems to be followed by several other countries, including the United States vigorously developed and popularized by Catherine Lewis, who has done research on Lesson Study in Japan since 1993. While in Indonesia has now started to intensively socialized to serve as a model in order to improve student learning, even at some schools have started to put into practice. Although at first, Lesson Study was developed in elementary education, but currently there is a tendency to be applied also in secondary education and even higher education. Lesson Study is not a strategy or a method of learning, but it is one of the construction effort to improve the learning process performed by a group of teachers in a collaborative and sustainable, in planning, implementing, observing and reporting on learning achievement. Lesson Study is not just a project, but an ongoing activity is relentless and is an attempt to apply the principles of Total Quality Management, the process and improve student learning achievement continuously, based on the data. Lesson Study is an activity that can encourage the formation of a community of learning (learning society) that consistently and systematically self-improvement, both at the level of individual and managerial. Slamet Mulyana (2007) gives the formulation of the Lesson Study as a model of professional development of educators through collaborative learning and assessment based on the principles of sustainable psrinsip collegiality and mutual learning to build a learning community.

Bill Cerbin & Bryan Kopp argued that Lesson Study has four (4) main objectives, namely to: (1) obtaining a better understanding of how students learn and teachers teach, (2) to obtain certain results which can be used by the other teachers , outside of lesson Study participants, (3) systematically enhances learning through collaborative inquiry. (4) establish a pedagogical knowledge, where a teacher can gain knowledge from other teachers. On his other writings, Catherine Lewis (2004) also argued about the essential features of Lesson Study, which is obtained based on the observation of several schools in Japan, namely:

1. Common goal for the long period. Lesson study preceded the agreement of the teachers on the common goal of wanting improved within the long term with a broader range of goals, such as about: developing students 'academic skills, individual skills development of students, students' learning needs, developing fun learning, develop craft students in learning, and so on.
2. Important subject matter. Lesson study focusing on the subject matter or materials considered important and the weak points in student learning as well as very difficult for students to learn
3. A careful study of the students. The most important focus of Lesson Study is the development and learning of the student, for example, if students show interest and motivation in learning, how students work in small groups, how students perform the tasks that the teacher, as well as other matters relating with activity, participation, and the condition of each student in participating in the learning process. Thus, the focus is no longer only focused on how teachers teach as usual in a classroom supervision conducted by the principal or school superintendent.
4. Direct observation of learning. Direct observation can be said is the heart of Lesson Study. To assess the learning and development activities carried out are not enough students made only by means of a notice Lesson Plan or just look at the video of the show, but also to observe directly the learning process. By direct observation, the data obtained on the learning process will be much more accurate and complete, even to the detail of things though can be extracted. The use of videotape or tape can be used only as a complement to, and not as a replacement.

Based on interviews with a number of teachers in Japan, Caterine Lewis argued that the Lesson Study is very effective for the teachers for providing benefits and opportunities for teachers to be able to: (1) to think more carefully about the purpose, certain content that will be taught to students, (2) to think deeply about the learning objectives for the benefit of future students, for example, about the importance of friendship, the development of students' perspectives and ways of thinking, and fondness for science students, (3) learn about the best things that can be used in learning through learning from other teachers (participant or participant lesson Study), (4) learn about the contents or subject matter of the other teachers so that they can gain knowledge about what should be given to the students, (5) develop expertise in teaching, both at the time of learning and planning during learning activities, (6) building capacity through collegial learning, in the sense that teachers can learn from each other about what is perceived is still lacking, both on knowledge and skills in teaching students, and (7) develop "the Eyes to See Students "(kodomo wo miru me), in the sense that with the presentation of the observer (obeserver), observations of student behavior can be more detailed and clear.

Lesson study activities are very strategic to create an academic atmosphere conducive to the improvement of the quality of the course. Young teachers are relatively inexperienced teaching does not feel "nurtured" though obviously the teachers get the learning, both practical and theoretical, associated with the implementation of the course. Through

learning activities lesson study senior lecturer gets an excellent opportunity to provide guidance to young professors, who have been hard done (Istamar and Ibrahim, 2008).

Associated with the implementation of Lesson Study, Slamet Mulyana (2007) explores the implementation of two types of Lesson Study, which is a school-based LS and LS-based MGMPs. School-based Lesson Study conducted by all teachers from various fields of study concerned with the principal. with the goal of keeping the quality of the learning process and outcomes of all subjects in the school can be improved. While MGMPs Lesson Study is based on the assessment of the learning process is carried out by a group of teachers of certain subjects, with the deepening of the study of the learning process on a particular subject, which can be implemented at the regional, district or perhaps could be expanded again. In terms of group membership, Lesson Study Reseach Group of Columbia University suggested enough only 3-6 people, which comprises elements of teachers and principals, and other interested parties. Principals need to be involved mainly due to its role as a decision maker in school. With involvement in Lesson Study, principals are expected to take important decisions and appropriate for improving the quality of learning in school, especially on subjects that were examined through Lesson Study. Also, it can also invite other parties deemed competent and have concern for student learning, such as school inspectors or experts from universities. Isjoni, (2007) stated that cooperative learning is a learning model in which students learn and work in small groups (4-6) with the heterogeneous structure of the group. Through cooperative learning allows students to achieve success in learning together can also train the students to have the skills to express opinions, to receive feedback from others, cooperation, solidarity and reduce the incidence of deviant behavior in the classroom of life.

Lesson study can be implemented in schools in accordance with the needs and opportunities. Keep in mind that not all of the materials or topics that exist within an existing curriculum is presented using lesson study. It really depends on the characteristics and nature of the material or existing topics. Basically a lesson study can be carried out one or two times in a month, as well as two or three times in one semester. It really depends on the ability, willingness, and deal parties. Through lesson study, especially school-based lesson study teachers school sector in the study plot can share and learn from one another. Teachers can give each other feedback how to make lesson plans appropriate to the learner, appropriate facilities and infrastructure, and in accordance with the teacher's ability to do it. After implementing the learning, teachers are able to provide comments and suggestions. For example, how to help students learn and how to revise and refine lesson plans have been developed, so the SBC program that matches the school can really be developed. (Herath Susilo, 2009).

This study specifically aims to: (1) To determine the success of lesson study with the application of the cooperative model in Calculus I course in the Department of Mathematics, (2) To determine the students' learning activities during the process of learning that are beneficial to the faculty in implementing the learning.

II. RESEARCH METHODOLOGY

The method used in this study using classroom action research (CAR) and adapted to the conditions of the development of the research conducted in the Department. Study pattern through the stages of planning, implementation,observation and follow-up . The research was conducted at the Department of Mathematics UNIMA students first semester of class 2011/2012 academic year with 28 special people in the Mathematics Education Program with class B. Phase-stage research activities can be described as follows

1. Stages of Planning (Plan)

In the planning phase, the team faculty who are members of Lesson Study collaborating to develop lesson plans that reflect a student-centered learning. Planning began with analyzing the needs and problems faced in learning, such as about: basic competencies, how to teach on students, anticipate shortage of facilities and learning tools, and so on, so as to know the various real conditions to be used for the sake of learning. Furthermore, together also look for a solution to solve all the problems that are found. Conclusions from the analysis of the needs and problems into parts that have to be considered in the preparation of lesson plans, so that the RPP to be planning something really very mature, which also can anticipate all possibilities that will occur during the execution of the learning takes place, either in the early stages, the core stage until the final stage of learning.

2. Stages of Implementation (Do)

At the second stage, there are two main activities, namely: (1) the implementation of learning activities undertaken by one of the lecturers agreed model or the request for a practice lesson plans that have been drawn together, and (2) the observation or observation activities conducted by members Lesson Study or another community (read: team members lecturer, group or team of expertise (CBC), or head of the Department, or other regulations that act as observers /

observer). Several things must be considered in the implementation phase, including:
1. Lecturer in accordance with the implementing learning lesson plans have been compiled together.
2. Students can be pursued through the process of learning in a reasonable and natural setting, not in a state under pressure due to the Lesson Study program.
3. During the learning activities take place, observers are not allowed to disrupt the learning activities and distraction models lecturers and students.
4. Observers to observe carefully the interaction of students, student-learning materials, student -faculty, student-learning and other facilities, using observation instruments that have been previously prepared and compiled together.
5. Observers should be able to learn from the learning that takes place and not to evaluate the model lecturer.
6. Observers can do video recording via camera or digital photo documentation and materials for the purposes of further analysis and recording activities do not disrupt the learning process.
7. Observer shall record the behavior of students during the learning takes place,

3. Stage of Reflection (Check)

The third stage is a very important stage for further efforts to improve the learning process will depend on the sharpness of the analysis of the participants based on observations of teaching practices that have been implemented. Reflection activities carried out in the form of discussion that followed throughout the Lesson Study participants were guided by one of the observers or other designated participants. Discussions began delivering his impressions of professors who have been practicing learning models, by submitting a comment or suggest a particular impression on the public as well as the learning process is done, for example, the perceived difficulties and problems in carrying out lesson plans that have been prepared. Furthermore, all observers submit comments or suggestions are wise to the learning process has been implemented (not the lecturer concerned models). In delivering its advice, the observer must be supported by evidence obtained from observations, not based on his opinions. Various talks that developed in the discussion can be feedback to all participants for the benefit of the repair or improvement of learning process. Therefore, all participants should also have records of conversations that took place in the discussion. Observations focused on the implementation of student activities immersion learning process. Observational learning focus in this study on the application of cooperative learning model among students. Parameter learning activity of students in Calculus I course on activities such as: 1. The ability to analyze the concept matematics appropriate topics of discussion, 2. Outlining capabilities in the use of mathematical concepts mathematical models. 3. Ability to deciminate knowledge inter student groups, between groups of students and between students and faculty in the team model of course. 4. The ability to provide analysis of the application of matematics concept in knowledge,technology and art.

4. Follow-up stages (Act)

Reflections can be obtained a number of new knowledge or important decisions for the improvement and enhancement of learning processes, both at the individual level, as well as managerial. At the individual level, the findings and delivered valuable input during discussions in the reflection stage (check) would be a capital for professors, which acts both as a teacher and observer to develop a learning process for the better. At the managerial level, with the direct involvement of the Heads of Departments as Lesson Study participants, of course, the Heads of Departments will acquire a number of valuable inputs to the interests of the development of management education in the Department as a whole. If during the Heads of Departments too busy with the general administration issues with direct involvement in the Lesson Study, the head of the Department will be better able to understand what is actually experienced by faculty and students in the learning process, so expect the Heads of Departments can focus more to achieve itself as a leader in the area of education. Stages of research activities as in Figure 1.

III RESULTS AND DISCUSSION

1. Research results:

Based on the results of observational research process is divided into two phases, namely the first observation of students' learning activities and the second based on the results of tests to see student achievement. Observation of students' learning activities observed by the observer team in planning appropriate learning patterns consisting of lesson study teams lecturer in Calculus I and Heads of Departments and the KBK team. Observations made include: I. Ability to analyze mathematical concepts appropriate topics of discussion, II. Outlining capabilities in the use of mathematical concepts mathematical models. III. Ability to disseminate knowledge of international student groups, between groups of students and between students and faculty in the team model of course. IV. The ability to provide

analysis of the application of mathematical concepts in science, technology. Liveliness grouped by: (4) Very active, (3) active, (2) is quite active, and (1) Less active. Observations on the students' learning activities such as Tabel 1.

Group	Student Score	The active participation of students in the lecture Calculus I																Jl	
		I				II				III				IV					
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
A	1			3					4			3				3		13	14.25/4=3,56
	2				4			3					4				4	15	
	3			3					4			3					4	14	
	4				4				4				4			3		15	
B	1		2						4			3				3		12	14,00/4=3,50
	2				4			3					4				4	15	
	3			3					4			3					4	14	
	4				4				4				4			3		15	
C	1			3					4			3				3		13	14,25/4=3,56
	2				4			3					4				4	15	
	3			3					4			3					4	14	
	4				4				4				4			3		15	
D	1			3				3				3				3		12	13,75/4=3,44
	2				4			3					4				4	15	
	3		2						4			3					4	13	
	4				4				4				4			3		15	
E	1			3					4		2					3		12	14,00/4=3,50
	2				4			3					4				4	15	
	3			3					4			3					4	14	
	4				4				4				4			3		15	
F	1			3					4			3				3		13	13,75/4=3,44
	2				4			3					4				4	15	
	3			3					4			3				3		13	
	4				4			3					4			3		14	
G	1				4				4			3					4	15	14,75/4=3,69
	2				4			3					4				4	15	
	3			3					4			3					4	14	
	4				4				4				4			3		15	

Table 1. Results of student activities for learning Calculus I

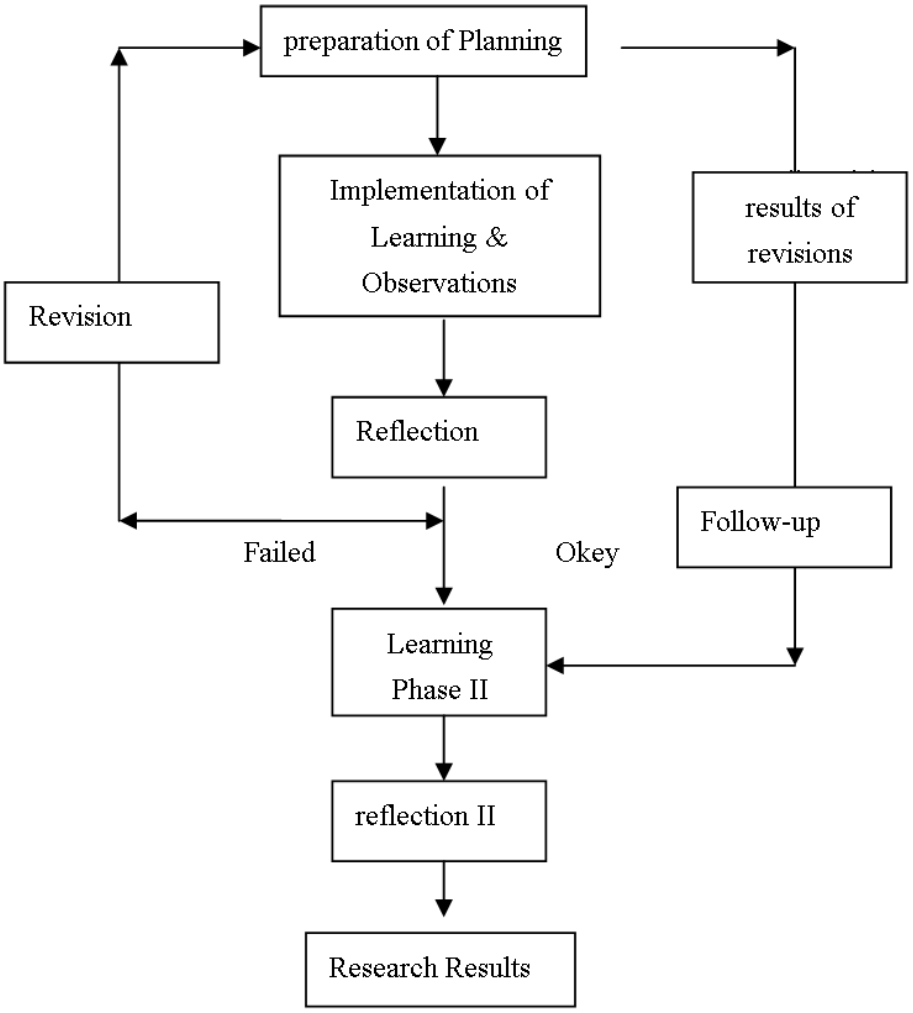

Figure 1. Design Research Process

The observation is based on students' test as Table 2. Tests given to students include material: Relations, Functions and derivatives. The test is given 3 times to test the mechanism given after appropriate topic given learning materials. The results obtained are described in Table 2.

Table 2. Mastery learning students on test 1, II and III after learning

Criteria	Frequency			Percentage (%)		
	I	II	III	I	II	III
complete	24	24	23	85,71	85,17	82,14
Not completed	4	4	5	14,29	14,29	17,86
Number	28	28	28	100	100	100

Description: I: Relationships Matter, II: Function and Materials III: The material derivative

2. Discussion of Research Findings

Based on the results of Table 1. above it appears that all groups in the activity patterns of the learning process through lesson study in college Calculus I are very active. The active participation of students in a group lesson study showed that the pattern can generate a conducive learning atmosphere both among students and faculty. Table 1 shows no difference in the variation of the highest active ranging from group G has a level of activity that is very active with the score (3.69) compared with the other groups. After the group G followed by A and C are the same level of activeness (3.56), then group B and E (3.50), and group D and F at the end of the sequence (3,44).

Table 2 is based on mastery learning students on tests I, II and III show that all achieve mastery. Variation based mastery learning materials discussion are: the material relations of students achieve mastery of 85.71%, the material functions achieve mastery at 85.17%, while the material derivative achieve mastery of 82.14%. These results show that the pattern of lesson study using cooperative learning model in lectures on Calculus I in three material lectures to increase student learning success. Students who achieved success in the group showed that the dissemination of knowledge of inter occurred in lesson study groups. It is shown that the achieved value of each active group evenly spread these circumstances influence the achievement of student learning outcomes in value at the same relative group achievement of learning outcomes. This result is in line with the concept of cooperative learning that enables students to achieve mastery learning based on the achievement of groups of students. Mastery learning achievements of students in the group are also at the core of the activities of lesson study, where the success of the group will establish the success of the class.

IV Conclusion

Based on the obtained results it can be concluded as follows:

1. Student learning outcomes with the pattern of lesson study with cooperative learning model to improve learning outcomes of students to achieve mastery of 85.71% for the material relations and functions, while for the material derivative reaches 82.14%, on the Calculus I course in the Department of Mathematics UNIMA

2. Models of cooperative learning in college Calculus I with the pattern of lesson study allows the exchange of learning between faculty and students and between students and students and between faculty and lecturers.

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